

EFFECT OF TEACHING BY HANDS-ON STRATEGY ON THE ACHIEVEMENT OF SECOND INTERMEDIATE -GRADE FEMALE STUDENTS IN SCIENCES

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ABSTRACT : The research aimed to identify "the effect of teaching by hands-on strategy on the achievement of second-intermediate female students in sciences and science operations", through the following null hypothesis:

(There are no statistically significant differences at the level (0.05) between the mean of scores of female students of the experimental group who were taught according to hands-on strategy and the mean of score of female students of the control group who were studied according to the usual method of achievement of the subject of science).

The experimental design was chosen with two experimental and control groups, one of which controls the other partially from the post-test subjects, representing the current research community with all the second intermediate students in the intermediate and secondary schools affiliated to the Baghdad Education Directorate / First Al-Rasafa for the academic year (2020-2019), and a medium school was chosen Noor Al-Islam for girls) intentionally to represent the research sample, which has a number of female students (108) students distributed over four study classes (A, B, C, D). Fellows The number of female students in the experimental and control group reached about (50) students, by (26) students of the experimental group (b) that was studied according to hands-on strategy and (24) students of group (a) control that were studied according to the usual method.

The two groups were rewarded in variables (intelligence, previous achievement, previous information). The experiment was conducted in the first semester of the academic year (2020-2019) and lasted (9) weeks, with four lessons per week.

The researcher studied the students of the two groups by themselves and determined the scientific subject in the first and second units of the science book , 2017 in the topics (elements and compounds, chemical reactions and solutions). The researcher prepared (19) teaching plans according to hands-on strategy to teach the students of the experimental group and the like according to the usual way to teach the students of the control group

To test the validity of the null hypothesis, the researcher prepared an achievement test of (30) items, of which (28) were an objective multi-choice type with four alternatives and two article essays. The validity and reliability of the instrument were verified, and the reliability of the test was extracted using the formula (Kuder - Richardson 20), as it reached (0.80), in addition to extracting psychometric properties

Using t-test for two independent samples , the results of the research showed exceeded the experimental group students who were taught according to hands-on strategy over the control group students who studied according to the usual method in the achievement test, then the calculated t-Test reached (3.19) at the level of (0.05).

In light of the results, the researcher concluded that teaching with hands-on strategy has an impact on the achievement of female students in the science subject, as the impact size reached (0.17) with a (large) estimate compared to the criterion (0.14)

I. CHAPTER ONE**Introducing Research****The Research Problem:**

The current research problem lies in the low level of achievement in general, and science for the second grade is medium in particular, and this was confirmed by the study (Al-Masoudi 2: 2016) and the study (Hussein 2: 2017) and the study (Abdul Karim 2: 2019), as it indicated the determination of the low level of achievement in chemistry.

Through the researcher's discussion of a number of science teachers for the second intermediate grade of (15) teachers and schools who have an experience no less than five years distributed among a number of intermediate and secondary schools affiliated to the Directorate of Education in Baghdad / First Al-Rasafa, after submitting the survey questionnaire, results have resulted Analyze their answers that:

- 1- (85%) of them are still using teaching methods based on indoctrination and interrogation, while.
- 2- (90%) of the course teachers confirmed that there is a clear decline in the level of female students' achievement.
- 3- (100%) of the answers confirmed that they did not know about hands-on strategy.

Hands-on strategy was chosen as an experimental attempt to identify its reflection in the achievement of the second year students in the intermediate of science.

Thus, the research problem can be formulated: What is the effect of teaching with the hands-on strategy on the achievement of second-year intermediate school students?

The Importance Of Research

One of the components of scientific knowledge that the rapid developments of knowledge generate many scientific concepts, which are, it is the basic building block upon which science is based, and also it has become necessary for the student to have an appropriate level of knowledge in general and scientific knowledge in particular that he uses in His daily life, which helps him understand everyday phenomena and events as well as explain them and understand the interrelationship between science and society on the one hand and environmental problems resulting from scientific activities on the other (Al-Adhami and Abdel-Razzaq 35: 2018)

Educational practices in general and the field of science education in particular have witnessed tremendous strides towards the better, to keep pace with this progress, as renewal and development has become a clear feature and one of the most important features and features of the educational process, because of their scientific and technological challenges. Modern trends in effective education and learning are among the important measures that aim to change for the better in the educational process (Abu Samura 2-9: 2015)

Practical education aims to provide students with a greater set of sound scientific experiences, knowledge, skills and trends as well as the methods of scientific thinking necessary to indoctrinate them and inform them scientifically and it also helps them to benefit from their capabilities and capabilities in all fields in general and the scientific fields in particular that accrue to them as well as to their community with great benefit and public benefit. (Sabri and Salah 29: 2005), and that the teaching of science has an important and effective role in general practical education for the educated individual and the importance of this role increases in our present age in which scientific knowledge as well as scientific thinking and scientific trends become among the expected learning outcomes that must be formed and developed among educated students. (Razuki and Fatima 35: 2005)

(Al-Huwaidi 2005) emphasizes the importance of modern teaching methods that are represented by making the student the center of the educational learning process and one of its primary basic elements among the elements of the educational process in order to improve and raise the level of achievement, especially in the subject of science through the numbers of students who participate actively in a room Class as well as applying what they have learned in their daily lives to be productive workers, good citizens and educated individuals throughout their lives. (Al-Huwaidi 49: 2005)

So the main tasks of teaching science have become learning the student how to think, how to use laboratory materials and tools well, and how he uses his senses for better learning events and better understanding, not teaching him how to memorize study materials without understanding and understanding, as well as helping him to employ and apply information in his daily life , And understanding the skills of science operations and their application steps. (Al-Bazzaz and others 1: 2001)

Because chemistry is an important study material because it gives an explanation for many natural life phenomena that are directly related to human life and society, because of the concepts, facts, and natural laws it contains, so modern methods, teaching methods and strategies in teaching chemistry must be followed in order to help students to build Sound scientific knowledge in a meaningful way, especially since the teaching methods of teachers are still primitive (traditional) and ineffective. (wang2003: 32)

Many researchers in the domain of education, such as (Hsio Hus), have indicated that teachers' use of traditional teaching methods based on the lecture method makes students passively dependent on automatic memorization, which makes them memorize a large amount of fragmented information on the back of the heart. (Hus 2005: 2)

Therefore, it has become imperative for educational institutions to focus on adopting modern teaching strategies that engage students in an effective manner that appears as a noticeable performance in the classroom, as well as organizing student learning in light of the followers of the scientific method of thinking, and many modern teaching strategies have emerged. (Katame 100: 2013)

Among these modern strategies for effective education is hands-on strategy or hands-on learning method that depends on the principles of active (active) learning, that is, the student's activity in the classroom and its interaction with others on the one hand and with the materials of the environment on the other hand, and changing its role from the future Negative to the positive reactor, it aims to employ its senses through learning (active and active). This enables him to access the correct scientific information or concepts through observation, discrimination, conclusion, interpretation and prediction. (El Desouky 50: 2008)

Where teaching science curricula depends on the use of modern teaching strategies that focus on cooperative and applied work, as the student's role is active and active in the learning process, and here reliance is placed on diversification in the educational activities provided, whether they are classroom or extracurricular activities. (Support 14: 2015)

Achievement has great importance in adapting and adapting students in their daily lives to their community, as well as in facing the problems they are exposed to by using their cognitive knowledge to think and make a suitable decision now or in the future, in addition to competition in life to obtain prestigious degrees in their society and thus enable them to obtain Professional job or business that best suits their capabilities. (Zaghoul and Ali 305: 2014)

Raising the level of academic achievement among students is one of the goals of teaching science in general at all levels of study. The academic achievement reflects the results of learning and the success of the educational process in achieving the desired goals, as well as a prerequisite for students to move from one stage to a higher academic stage. (Al-Dhahir 1999: 50)

Thus, the importance of research emerges from the importance of adopting teaching strategies that studies have shown their effectiveness in raising the level of achievement, including hands-on strategy.

Upon, the importance of the current research is summarized in the following points: -

1- The importance of the science subject and the use of modern strategies in its teaching as it is a basic subject and an important axis in many fields that make it a fertile field for scientific educational activities, which students perform when they face the life situations related to the educational subject.

2- The current research is a modest contribution to what educators advocate in the area of improving and developing methods of teaching science, and also in raising the level of achievement in the science subject for intermediate school.

3- The importance of Hands-on strategy in its attempt to find innovative solutions to address students 'problems in understanding and understanding concepts.

The Research Aim and Hypothesis

The current research aims to identify:

(The effect of teaching hands-on strategy on the achievement of second-year intermediate school students for science).

To achieve the goal, the following null hypothesis was formulated: "There are no statistical significant differences at the level (0.05) between the mean of scores of students of the experimental group who are studying by hands-on strategy, and the mean of the scores of the students of the control group who are studying by usual method of test of achievement in science".

The Research Limits: The current search is limited in:

1. Students in the second intermediate grade in the Nour Al Islam intermediate for girls, and they were deliberately selected from one of the schools affiliated to the Baghdad Education Directorate / first Rusafa.
2. The first semester of the year 2019-2020
3. The academic subjects covered in the first and second units (elements, compounds, chemical reactions and solutions) from the science textbook for the second intermediate class, 1st floor, 2017, Ministry of Education, Republic of Iraq.

Defining The Terms:**Hands-on Strategy Define:**

(Simpson, T. 2003) It is: "A strategy that focuses on effective student participation in the use of living and non-living models in education." (Simpson, T. 2003: 22)

The researcher defines it procedurally as: "a set of procedural steps practiced by the researcher in teaching units (first and second) from the science book scheduled for the second intermediate class for students of the experimental group in a manner that includes employing the skills of male and female students together, with their followers stages (let's start, research and discover, building Meaning, expansion of knowledge), with the aim of improving their level of achievement in science. "

Achievement : It defined by:

- (Razzouki and Dhimaa 2017) as: Mastering a set of skills and knowledge that a student can possess after subjecting him to educational experience in a specific study subject or a group of subjects, and represents the measure of the learner's ability to understand the prescribed study subjects and his ability to apply them through measuring means. (Razzouki and Damia 99: 2017)

- The researcher defines him procedurally as: "It is the degree obtained by students of the research sample in the science subject as a result of their teaching the textbook subject and it is measured by the total degree obtained by the student in the achievement test prepared for the purposes of the current research.

II. CHAPTER TWO: BACKGROUND THEORY AND PREVIOUS STUDIES**Theoretical background****Hands-on**

Hands-on Strategy is an integrated project that contains most of the principles set by modern strategies, and which depend on the principles of active (effective) learning and changing the student's role from the negative future to interacting with others on the one hand and with the environment around it on the other hand. Also, learning with a notepad by hands-on has become not just dealing with things, but rather expresses actual engagement in deep inquiries about things, materials, phenomena and ideas, defining meanings and understanding issues through scientific experiences. And the importance of the inquiries that students make to the basic scientific principles through which students can observe and understand the facts of science. (Jege & Taylor, 1995: 1)

Hands-on strategy emerges from the structural theory that depends on the student's interaction with others and also with the environment through active (active) learning, since the teacher is a guide and guide to the educational process within the classroom, where the student learns by employing his senses through manual work This enables him to access information through observation, interpretation, comparison, classification, taste, touch and discrimination. (El Desouky 50: 2008) (Bryant & Others, 2013: 334)

As the constructivist theory emphasizes the student's positive role in building and shaping knowledge, and she views the learning process as a dynamic adjustment process in which practical experience or new knowledge interacts with the previous knowledge or experience present in the student's mind, so the previous and new experience is modified and completed in the light of the social interaction that The student performs in the learning environment. (Atiyah 246: 2015)

The idea of the strategy is to employ the students' senses in learning the material and developing their contact with the natural world around them so that they can discover and understand it. This idea aims to learn the material through the use of senses, exploration, and scientific investigation. (Ambosaidi 199: 2019)

Where hands-on strategy provides scientific material in the form of scientific activities and simple experiments, using the simple materials of the environment in conducting them, as they go according to several stages, and these stages are divided into: -

First: Four basic stages to be implemented during the class, which are as follows

Second: two secondary or implicit stages, namely: (the stage of working at home, the evaluation stage)

It was identified by (El-Desouky 57-54: 2009) and (Ambosaidi et al. 200: 2019), and these stages can be detailed, as follows: -

1. Let's start:

It is the stage of preparation for the lesson where the teacher gives his students the opportunity to express their ideas freely, ask their questions and questions, and the students deal with some of the requirements that raise their motives towards working and learning together, where they practice their work and impose assumptions, where they feel that they need to perform activities to search for the necessary information , For the purpose of answering their questions. (Ann 2004: 14)

2. The stage of research and discovery:

At this stage, students are divided into small groups, and the task is to think about solving the presented problem and practice various activities while employing the raw materials of the environment. Where students practice some of the science processes skills, whether basic or complementary, in addition to practicing higher thinking skills. (Katherine 2003: 52)

Also, this stage needs the teacher to be a guide and guide to the learning process, and it should provide sufficient time for his students to research, investigate, collect ideas and reach information. (Kethcheson 2002: 3)

3. The stage of building meaning (clarification):

In this stage, the students 'results are discussed, the most important new ideas are identified, and their results are compared to those of other groups. (Ombo Saedi 200: 2019)

4. The stage of expanding knowledge:

Providing additional activities to confirm students' acquisition of the most important points in the lesson, i.e. students linking new ideas and their alternative perceptions and correcting them and applying their findings in new situations. Where students invest their findings in the stage of (research and discovery) in solving new problems that may face them, where they come to understand the relationships between the knowledge and information reached and their daily lives, and here the teacher must provide his students with some new tasks, which need To use the knowledge and information learned during the lesson (Peter 1999: 49)

5. Work phase at home (extra-curricular educational activities):

Worksheets are used at home, where students interview family members to discuss questions about what? And how? And why? (Riyadh 478: 2008)

The family also has a clear role in the learning process by providing a sound environment for students, as hands-on strategy enables the student to participate with his family (guardians) in the educational activities entrusted to him.

6. Calendar in Hands-on

It is divided into three types or stages, which are

A- Pre-assessment (preliminary): It aims at determining the level of students and the points that must be focused on. It takes place at the beginning of the lesson in the "Let's begin" stage. It is characterized by this type of evaluation, helps in identifying the points that must be focused on and then adjusted to meet the needs of students.

B- Continuous Evaluation (Progressive): aims to know the extent of students' acquisition of scientific concepts and aims to evaluate their abilities and skills in performing practical activities , during the teaching in the stages "research, discovery, meaning-building and expansion of knowledge" is carried out. It also aims to provide both the student and the teacher with the necessary feedback to improve the learning process and education at the best end. (Zayer et al. 2014: 2014)

C- Final Evaluation: It aims to measure the students 'concepts and skills that are included in the subject of the lesson and thus the extent to which they achieve the objectives of the lesson, and is carried out at the end of the lesson, where it is divided into two practical and theoretical parts:

(Al-Desouki 53: 2008) explained the annular shape of the stages of the strategy of hands-on , as in the following figure



Figure 1: The annular shape of the stages of hands-on strategy is illustrated

It is noted from the previous annular form that the stage of expansion of knowledge can lead to the beginning of new questions and inquiries for research, and we also find that the fifth stage which is work at home (the role of the family) where the role of the family appears through the homework (extra-curricular activities) that is done with the help of the family, Where the student is based on the performance of the learning activities that pertain to the lesson or a specific subject, as we find that the sixth stage, which is the evaluation stage, is included in each lesson, meaning that the fifth and sixth stages are not neglected, but they are implicit within the four basic stages.

It is clear from the above that the implementation of hands-on steps depends on:

1. Asking questions and experimental situations (problem).
2. Arousing student interest, curiosity, and a desire for new discoveries.

3. Provide an opportunity for students to carry out various activities, and different explorations.
4. Enhance students' self-confidence in self-reliance.
5. Family participation through homework and extra-curricular educational activities.

Hence , we find that hands-on strategy is a new addition in the field of practical education, through which the education process can be developed in all fields in general and the field of science in the intermediate stage in particular.

Achievement

Achievement in its broad framework includes the acquisition of knowledge, thinking processes, psycho-emotional skills, and these are very influencing factors in the formation of the student's personality, as it determines the degree that is not of social or economic value to the student, as it is one of the indicators of career aspiration and the social class that the student aspires to achieve, which is It is used to indicate the degree of success achieved by the student in his field of study and level. As it is the final result of learning. (Al-Salkhi 12: 2013)

Related Studies

Studies on hands-on strategy

- Study of (Sadi, Ö. 2011): conducted in Turkey / Ankara, aimed at knowing the effect of teaching on Hands-on activities on students' achievement and their attitudes towards science. The sample reached (170) students from the sixth grade primary students, divided into four semesters, which included two experimental groups, with (72) students, two control groups, with (68) students. The researcher used the experimental research method, the researcher used a test for scientific achievement (SAT), and a scale of scientific trends (SAS).

Study of (Mohammed, 2020): It was conducted in Egypt, aimed at investigating the effect of using the hand model of the notebook supported by the review process in treating writing errors among sixth graders. The researcher chose a sample from the sixth primary class students in Gharbet Thabet Basta School for Basic Education, which consisted of (30) students. The researcher used the curriculum of the experimental research method using the semi-experimental one-group design and the researcher prepared a test for writing errors

III. CHAPTER THREE

Research Procedures

Experimental Design

The researcher used the experimental method, she chose an experimental design with two groups (experimental and control) with partial control, one of which controls the other partially and from the post-test to measure achievement. Scheme 1 illustrates this.

Group	Equivalence	Independent Variable	Dependent Variable
Experimental	Intelligence Past Achievement Past Information	Strategy of Hands-on	Achievement
Control		Usual Method	

Scheme (1) experimental design for the two groups (experimental and control).

Research Community & Sample.

A. Research Community

The current research community was represented in all the students of the second intermediate class in the Nour Al Islam intermediate school for girls, who were intentionally chosen from one of the secondary and intermediate schools, affiliated to the General Directorate of Education in Baghdad / Rasafa First, for the

academic year (2020-2019), as the research community reached (108) A student of four (A, B, C, and D) students, whose number is (27,26,28,27), respectively, and the researcher selects the school intentionally for the following reasons: -

- 1- The school administration expressed their full cooperation with the researcher in conducting the research and its willingness to help overcome potential difficulties facing the researcher.
- 2- Female students come from one geographical area, as it forms a socially, culturally and economically homogeneous environment, which makes it easier for the researcher to have equivalence procedures between female students of the two research groups.
- 3- School hours are uniform morning for all classes.
- 4- The school contains (4) people for the second intermediate grade, and this is consistent with the requirements of experimental design and gives freedom to random appointment to the experimental and control groups.

B- Research Sample:

The sample of the research was random chosen by (the lottery), the two classes (B, A), who are (55) students, and (B) class was chosen to represent the experimental group, and (A) to represent the control group, by (28) students for the experimental group, and (27) (A student of the control group, and it has been observed that there are three female students failing within the experimental group and there are two students who failed in the control group and they were statistical excluded from the experiment data with their stay in their classrooms in order to preserve the school system, and thus the final number of the research sample became (50) student by (26) A student for the experimental group and (24) a student for the control group. Thus, the sample of the research represented the second intermediate-grade female student community in Nour Al-Islam intermediate school for girls for the academic year (2020-2019) with a rate of (46%), which is a good percentage in experimental research.

Equivalence of the Research Groups

Although random selection, as well as the homogeneity of the two research groups with the cultural, economic, and social variables, as they are from one homogeneous environment that guarantees parity between the two groups, the researcher decided to make control of some of the variables that affect the dependent variables in order to ensure the internal integrity of the experiment, namely (intelligence, and previous achievement , And test previous information).

The Research's Requirements

1- Determining the scientific subject: The scientific subject was determined, as it included the first and second units that are taught within the annual plan for the content of science (chemistry) during the first semester of the academic year (2019-2020) for the second intermediate grade, of the year 2017. as follows

Unit one: - {chemical elements and bonding - chemical compounds}

Unit two: - {Chemical reactions and formulas - Solutions}

2- Formulating behavioral purposes: The researcher formulated (300) behavioral purposes, in light of (Bloom) classification in the cognitive domain, as behavioral purposes (remembering, understanding , application , analysis, synthesis, and evaluation) were distributed respectively, because it is one of the most common classifications preference and use. (Bloom 1983: 107)

3- Preparing the teaching plans: The researcher prepared teaching plans for the subjects to be taught during the experiment period in the light of the content of the scheduled book and the formulated behavioral purposes and reached (28) teaching plans by (14) plans for the experimental group according to the steps of the hands-on strategy, the same for the control group according to the usual method.

Two models of behavioral plans and goals were presented to a group of experts and specialists in the methods of teaching science and chemistry to find out their suitability for the purpose for which they were prepared, and in the light of their observations and strong opinions, necessary adjustments were made to the plans and set a percentage (78%) of the consensus and ready for implementation. The level of agreement between opinions on

behavioral purposes (87%), according to the Cooper formula for the agreement, some of these purposes were modified and other purposes were reformulated.

The Research Tool

To achieve the goal of the research and its null hypothesis of measuring the effect of the independent variable on the dependent variable (achievement of the second intermediate students in the subject “science” chemistry), the research tool numbers were required, so the researcher made a

Preparation Achievement Test

The researcher determined the aim of the test, which was intended to measure the achievement of female students in the research sample with the content of the science book (under current research) for the second intermediate grade.

The experimental map (table of specifications) was prepared for the six levels of Bloom's classification for the cognitive domain, so the researcher identified (30) test items distributed to science subject subjects within the limits of the current research of the scientific subject, the behavioral purposes that he will measure, and weights were extracted for the behavioral purposes of the levels (remember, Assimilate, apply, analyze, synthesize, and evaluate), and its apparent sincerity was confirmed by presenting the test to the arbitrators to express their opinions on the validity of the test items and adjusting some of them in the light of their opinions. The content is validated by the preparation of the specifications table (test map). Thus, the achievement test items were divided between the semester classes and the knowledge field levels more accurately, table (2) shows that.

		Mental Level Content		Remembering	Understanding	Applying	Analyzing	Synthesis	Evaluation	Total
				72	106	45	39	18	20	300
				%24	%35	%15	%13	%6	%7	%100
Chapter	Lessons Number	Percentage		Items Number						
One	Chemical elements and bonding	4	%29	2	3	1	1	1	1	9
Two	Chemical compounds	3	%21	2	2	1	1	0	0	6
Three	Chemical formulas and reactions	3	%21	2	2	1	1	0	0	6
Four	Solutions	4	%29	2	3	1	1	1	1	9
Total		14	%100	8	10	4	4	2	2	30

Table (2) test map for achievement test items.

The exploratory application of the test

The researcher applied the test to a first sample of (30) female students from the second year intermediate school in the same school (Al-Fawz Secondary School for Girls), which is affiliated to the General Directorate of Education in Baghdad, the first / 30 (30) female students, on (2020 / 1/19) On (Sunday), it became clear that the test instructions and items were mostly clear and understood by all students, and no questions were asked from students indicating the opposite, and it was clear and from the answer (42) minutes.

The second exploratory experiment was conducted on a sample of (114) female students from the second intermediate class in the Al Bashaer Elementary School of the General Directorate of Education in Baghdad, Rasafa / first. On (20/01/2020) corresponding to (Monday), the researcher supervised the application itself. After correcting the answers, the grades were arranged in descending order, and I took the highest 27% of the students' answers to represent the highest group and the lowest 27% of the students' answers to represent the lowest group. Psychometric characteristics of the test were extracted as follows: -

A- Difficulty factor of the items: The difficulty factor for the objective and essay test items were calculated by applying their equation, and it was found that the value of the difficulty factor for the objective test items ranged between (0.74-0.31), and the value of the ease factor, and found that it ranged between (0.65-0.26) As for the coefficient of difficulty of the article, it was found that it ranges between 0.60-0.48. Many measurement and evaluation scientists indicate that the acceptable range for the difficulty factor is the one whose value ranges between (0.80-0.20) (return 297: 1998), and thus the achievement test passes are good and acceptable.

B - Discrimination Factor for Items: When calculating the Discrimination Factor for each of the objective test items by applying their equation and they ranged between (0.26-0.68), and the two items ranged between (0.48-0.52), so the achievement test items are good.(Ebel, 1979) referred to in (Majeed and Yassin, 2012). The item may be considered acceptable if its coefficient of distinction is (0.20) and above. (Majeed and Yassin, 2012: 33)

C - Effectiveness of wrong alternatives: The alternative is more effective the more its value increases in the negative, and after calculating the effectiveness of the wrong alternatives for the achievement test items by applying the formula for the effectiveness of alternatives, all results were negative ranging between (-0.06 - -0.32), meaning that the wrong alternatives attracted a number of Students in the lower group are more than students in the higher group, which indicates the effectiveness of the wrong alternatives and thus test alternatives are good.

Test reliability: In order to verify the reliability of the achievement test, the researcher used Kuder - Richardson 20 equation to calculate the reliability of the objective test items of multiple choice type, as it is the most common way to extract the internal consistency of the test items whose items are corrected by giving zero For the wrong answer and one degree for the correct answer, the reliability coefficient value was equal to (0.795), as the tests are considered good if their reliability coefficient is (0.70) and above (Omar and others 2010: 232). Thus all the test items were retained. As for the reliability of the article, the researcher extracted the correction of the correction for her in a way of re-correction for the test with another teacher trained by the researcher on the correction method. . Using the Pearson equation, the reliability value between the researcher and the corrected (0.78) was high. (Allam 240: 2009)

Thus, the test in its final form became valid for application to the research sample consisting of (30) items, the highest degree that can be obtained (32) and the lowest degree (zero).

Experiment Application

The researcher started applying the experiment to the students of the two research groups (experimental and controlling), on (Sunday) corresponding to (06 Oct 2019) by teaching two classes per week according to the plans prepared for each group, so the teaching continued until Wednesday (29 Jan 2020) in the first semester of the year (2019-2020)

Statistical Means

The following statistical methods were used (t-Test for two independent samples, standard deviation, difficulty factor equation, ease factor, differentiation strength equation, wrong alternatives effectiveness equation, Kuder-Richardson 20 equation , Cooper agreement equation, eta-Squared effect volume equation (η^2) Through SPSS-26 program.

IV. CHAPTER FOUR

Research Results

Show Results. Presentation

To verify the null research hypothesis: (There are no statistical significant differences at the level (0.05) between the mean of scores of achievement of students of the experimental group who studied according to the strategy of hands-on hands and the intermediate levels of achievement of students of the control group who studied according to (the usual method) in the achievement test After correcting the female students 'answers, the mean and standard deviation were found, and the t-Test equation was applied for two independent samples that are not equal in number. The following results were obtained (table 3)

Table (3) (t-test) of the scores of the two research groups in the achievement test

Group	N	Mean	Std. Deviation	df	t-test		(0.05) Significance at
					Calculated	Tabled	
Experimental	26	22.76	4.10	48	3.19	2.01	Significant in favor of experimental group
Control	24	18.91	4.45				

From table (3) , it is clear that the arithmetic mean for the degrees of students of the experimental group (22.76) and the mean of scores of the control group (18.91), and the calculated value (t-test) (3.19) is greater than the tabular value of (2.01) at the level of (0.05), when Freedom degree (48), which indicates the presence of statistically significant differences in favor of the experimental group in the achievement test, between the scores mean of students of the experimental group who studied by hands-on strategy and the mean of the scores of the control group who studied by usual method, and this result was consistent with A study ((Sadi, Ö. 2011)) that hands-on strategy raises the level of achievement for female students.

To find out the effect size, the researcher used (η^2) equation to make sure that the differences resulting from the use of t-test are real differences due to the search variables, or they are due to chance, where the square of η^2 was calculated from the results obtained from the analysis of variance table (4).

The above table shows that the value of η^2 reached (0.17) and compared with the reference standard for the effect size (0.14) shows that it is (large), which indicates that hands-on strategy has had a (significant) effect in increasing the collection of students of the experimental group to the subject Sciences compared to their peers in the control group.

Calculated t-test	Tabled Value	η^2	Effect size
3.19	2.01	0.17	High

Table (4): The value of (t-test) and (η^2) and the effect size in the achievement test

V. CONCLUSIONS

In light of the results of the current research, the researcher was able to conclude the following: -

1. The results of the research showed a positive effect on the use of hands-on strategy, which contributed to raising the achievement of the intermediate second-grade students with a size of (0.15).
2. The use of Hands-on strategy encouraged students to explore, love knowledge, and explore.
3. Hands-on strategy can be used in chemistry subjects in our schools, according to the capabilities currently available.

4. The ability of Hands-on strategy to make learning an attractive process, and the female student's participation in constructing meaning enhances the skill of developing communication between them in a positive way through discussion and exchange of ideas.

VI. RECOMMENDATIONS

In light of the current research results, the researcher recommends the following:

1. Adopting effective teaching strategies, which includes hands-on strategy in teaching science for the second intermediate grade because of its impact on achievement that encourages students to learn and think.
2. Organizing training courses for science teachers on how to use hands-on strategy under the supervision of qualified trainers to teach and train them.
3. The need to pay attention to the extra-curricular household activities, because it helps to better learn students, and it also helps to integrate the family into the educational process by following the level of their children.
4. Include the science education curricula scheduled for students of colleges of education in general and the College of Basic Education in particular strategies, methods and modern methods in the teaching process, including effective teaching strategies, including hands-on strategy

VII. PROPOSALS

As a complement to this research and its development, the researcher proposes several proposals as follows: -

1. Carrying out another study that uses hands-on strategy and its effect on other types of variables (scientific inclinations, curiosity, acquiring chemical concepts, mental skills, tendency towards matter, habits of the mind, decision-making skill, innovative thinking, visual thinking, the skill of thinking above cognitive .. and others).
2. Conducting a similar study that uses hands-on strategy for different levels of study and subjects, in other subjects (biology, social studies, and mathematics)

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